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PROTECTIVE DEVICE FOR OBJECTS PLACED INSIDE THE REAR BOOT
OF A MOTOR VEHICLE

The invention relates to a protective device for objects placed inside the rear boot of a motor vehicle bearing a roof that folds away into the boot.

We know of a device for protecting objects placed inside the rear boot of a motor vehicle bearing a foldaway roof movable between a deployed position in which it covers the passenger compartment of the vehicle, and a folded, stored position in which it is stored and retracted in the boot closed with a hood. Such a device is the type comprising a panel forming the vertical limit between a protected zone of the boot used to receive the objects and accessible when the boot is open from the rear forward, and a second zone of the boot used to receive the roof in the folded, stored position and located above the protected zone, the panel being moveable between at least a low protecting position in which the protected zone fills a first volume which is free when the boot is closed and the roof is in its folded, stored position, and a high protecting position in which the protected zone fills a second volume which is free when the boot is closed and the roof is in its deployed position, first and second means for securing being used to lock the panel respectively in its low protecting position and in its high protecting position, the panel in the low protecting position being used to co-operate with a first sensor so as to authorise the folding of the roof.

Such a device is described, for example, in the French patent application 2 796 901. In this prior application, the rear boot is closed, on one hand, by a hood opening from the front backward in order to allow the roof to pass whilst moving between its folded, stored position to its deployed position and, on the other hand, by a rear door opening from

the rear forward in order to allow objects to be placed inside. In this prior application, the movement of the roof and that of the hood are controlled by actuators only when the panel is in its low protecting position, which ensures the protection
5 of the objects. The movement of the rear door is manually controlled, the user ensuring the protection of the objects.

However, there are vehicles for which the opening and closing of the rear boot is entirely automated: either, as in the aforementioned application, the boot comprises a hood and
10 a rear door whose respective movements are controlled by actuators, or, the boot comprises a hood controlled by an actuator and articulated so as to be opened from the front backward or from the rear forward.

For this reason, the devices for protecting objects of the prior art do not allow the objects to be protected during
15 the automatic closing of the boot.

The purpose of the invention is to resolve the aforementioned inconvenience, and to propose a device for protecting objects which is simple, reliable, cost effective,
20 easy to use and capable of ensuring good protection of luggage placed inside the rear boot of the vehicle irrespective of the closing movement of the closing element of the boot.

According to the invention, the co-operation of the panel with the first sensor is such that, when the panel is higher
25 than the low protecting position, the roof can not be folded, and the co-operation of the panel with a second sensor is such that, when the panel is higher than the high protecting position, the boot can not be closed.

The co-operation of the panel with either of the two
30 sensors depending on its position allows to efficiently and simply protect any object from damage that could be caused through the folding of the roof or the closing of the boot.

Other features and advantages of the invention will become clear in the following detailed description, in relation to the annexed drawings, given by way of non-restrictive examples:

- 5 - figure 1 represents a diagrammatic cross sectional view of the rear boot of a motor vehicle fitted with a device for protecting objects;
- figure 2 is a diagrammatic partial view of a device for protecting objects according to the invention, the panel
10 being in the low protecting position;
- figure 3 is a view similar to that in figure 2, the panel being in the high protecting position;
- figure 4 is a longitudinal sectional view of the rear boot of a motor vehicle fitted with a device according to
15 the invention;
- figure 5 is a perspective view of a device according to the invention; and
- figure 6 is a view similar to that in figure 4 of a device according to another embodiment.

20 A motor vehicle comprises a foldaway roof 1 which moves between a deployed position in which it covers the passenger compartment of the vehicle, and a folded, stored position in which it is stored and retracted into the rear boot 2 of the vehicle.

25 In the example illustrated in figures 1 to 6, the roof 1 comprises at least two roof elements, a front roof element 3 and a rear roof element 4, used to be folded substantially horizontally into the upper part of the boot 2.

30 The rear boot 2 is fitted with a hood 5 which is articulated to the body 6 in order to open, on one hand, from the rear forward so that objects 7 can be placed inside the boot 2 and, on the other hand, from the front backward so that the foldaway roof 1 can pass.

The vehicle is fitted with a device 8 for protecting objects 7 placed inside the boot 2. The protective device 8 comprises a panel 9 which forms the vertical limit between a protected zone 10 of the boot 2 and a second zone 11 of the boot 2 located above the protected zone 10.

The protected zone 10 is used to receive the objects 7 and is accessible when the hood 5 of the boot 2 is open from the rear forward. The second protective zone 11 is used to receive the roof 1 in the folded, stored position.

10 The panel 9 is rigid and it can be moved between at least a low protecting position and a high protecting position.

When the panel 9 is in its low protecting position, the protected zone 10 fills a first volume which is free when the hood 5 closes the boot 2, the roof 1 then being in its folded, stored position.

When the panel 9 is in its high protecting position, the protected zone 10 fills a second volume which is free when the hood 5 closes the boot 2, the roof 1 then being in its deployed position.

20 First securing means 12 are used to lock the panel 9 in its low protecting position, and second securing means 13 are used to lock the panel 9 in its high protecting position.

Furthermore, the panel 9, in the low protecting position, is used to co-operate with a first sensor 14 so as to authorise the folding of the roof 1 and the locking of the hood 5.

According to the invention, the co-operation of the panel 9 with the first sensor 14 is such that, when the panel 9 is higher than the low protecting position, the roof 1 can not be folded, and the co-operation of the panel with a second sensor 15 is such that, when the panel 9 is higher than the high protecting position, the boot 2 can not be closed, actuators being used to control the automatic opening and closing of the

boot 2 and the folding and deploying of the roof 1. Of course, both of the sensors 14 and 15 are connected to the electric circuit to which the means for controlling the movement of the roof 1 and the hood 5 are connected.

5 Thus, according to the invention, the objects 7 placed inside the protected zone 10 can not be damaged by either the roof 1 nor the hood 5 and, hence, the roof 1 can not be damaged by the objects 7.

10 Indeed, neither the roof 1, in the folded, stored position, nor the hood 5, in the closed position, can come into contact with the panel 9, in the low protecting position, because of the geographic position of the panel 9.

15 Furthermore, the hood 5, in the closed position, can not come into contact with the panel 9, in the high protecting position, because of the geographic position of the panel 9.

 If the panel 9 is higher than its high protecting position then the hood 5 can not be closed. Likewise, if the panel 9 is higher than its low protecting position then the roof 1 can not be folded.

20 Thus, irrespective of its position, the panel 9 is protected from being damaged by any movement of the roof 1 or the hood 5. Of course, this also stands for the objects 7 which are in the protected zone 10 for which it forms the upper vertical limit. Hence, the roof 1 is protected from any
25 contact with the objects 7 that could damage it.

 As can be seen in figures 2 to 5, an arm 16 is attached to each lateral side of the panel 9 in a movable manner in the transversal direction to the vehicle.

30 Each of the two arms 16 comprises a stub 17 which projects transversally towards the outside of the protected zone 10. Each stub 17 is used to penetrate into a first opening 18 which is made in an anchorage element 19 integral

with the body 6 and which defines the low protecting position, so as to lock the panel 9 in this position.

In the example illustrated in figures 2 to 5, each arm 16 extends towards the bottom of the boot 2 and is attached by its upper end, in a flexible manner, to the panel 9, each arm 16 being constantly solicited in the direction of the corresponding anchorage element 19. Each stub 17 is at the lower end of the corresponding arm 16. The flexibility of the arm 16 attachment to the panel 9 is sufficient to provide the corresponding stub 17 with a sufficient range of movement so that it can engage into and disengage out of the first opening 18 of the corresponding anchorage element 19. Each arm 16 comprises a handle 34 acting as a gripping means enabling the user to bend the arm 16.

As can be seen in figure 3, the first sensor 14 is housed in the first opening 18. It is made to be actuated by the stub 17 when the latter is in the first opening 18 (see figure 2).

As can be seen in figures 2 to 5, each anchorage element 19 comprises a second opening 20 which defines the high protecting position, and in which the corresponding stub 17 is used to penetrate in order to lock the panel 9 in this position. The second sensor 15 is housed in the second opening 20 and it is made to be actuated by the stub 17 when the latter is in the second opening 20 (see figure 3).

Furthermore, when the hood 5 of the boot 2 is open from the rear forward, the roof 1 being in its deployed position, the panel 9 can be placed in a high introductory position above the high protecting position so as to facilitate the placing of objects 7 in the protected zone 10.

Thus, as can be seen in figure 4, the distance between the rear edge of the panel 9 and the rear edge of the boot 2 has increased (see the distance A when the panel 9 is in its

high protecting position and the distance B when it is in its high introductory position).

Advantageously, third securing means 21 are used to lock the panel 9 in its high introductory position. As can be seen in figure 5, each anchorage element 19 comprises a third opening 22 which defines the high introductory position and in which the corresponding stub 17 is used to penetrate in order to lock the panel 9 in this position.

Of course, as long as the panel 9 has not lowered to its high protecting position, the hood 5 can not be closed. Moreover, as long as it has not lowered to its low protecting position, the roof 1 can not be folded.

In the example illustrated in figure 4, the vehicle is fitted with a device used to facilitate the placing of objects 7 under the roof 1 (device not illustrated). This device is used to guide the roof 1 from its folded, stored position to a folded, raised position in which the boot 2 is open from the rear forward, the roof 1 being at least partially projecting out of the boot 2. Thus, when the hood 5 of the boot 2 is open from the rear forward, the roof 1 then being in its folded, raised position, the panel 9 can be moved into a low introductory position above the low protecting position so as to facilitate the placing of objects 7 in the protected zone 10.

Thus, as can be seen in figure 4, the distance between the rear edge of the panel 9 and the rear edge of the boot 2 has increased (see the distance C when the panel 9 is in its low protecting position and the distance D when it is in its low introductory position).

Advantageously, fourth securing means 23 are used to lock the panel 9 in its low introductory position. As can be seen in figure 5, each anchorage element 19 comprises a fourth opening 24 in which the corresponding stub 17 is used to

penetrate in order to lock the panel 9 in its low introductory position.

Of course, as long as the panel 9 has not reached its low protecting position, the roof 1 can not be lowered and the
5 hood 5 can not be closed.

In this specific example, the structure of the securing means 12, 13, 21 and 23 is such that the panel 9 can only have four stable positions.

In the example illustrated in figures 4 and 5, the panel
10 9 is rotary mounted in relation to the body 6: it is supported, at its front end, by an axis of rotation 25 and oriented in the transversal direction of the vehicle, and around which it swivels.

In the example illustrated in figure 6, the panel is
15 mounted in a moveable connective manner in relation to the body via two pairs of swivel arms 26 and 27. The first pair of swivel arms 26 is rotary mounted, at a first end, in relation to the body 6, around a first swivel axis 28 and, at a second end, in relation to the panel 9, around a second swivel axis
20 29. Likewise, the second pair of swivel arms 27 is rotary mounted, at a first end, in relation to the body 6, around a third swivel axis 30 and, at a second end, in relation to the panel 9, around a fourth swivel axis 31. The panel 9 is guided by the rotation of the two pairs of swivel arms 26 and 27
25 which are arranged so as to form a parallelogram, each of the four swivel axes 28, 29, 30 and 31 being oriented in the transversal direction of the vehicle. Of course, not represented in figure 6, the panel 9 can be in the low and high protecting positions and the low and high introductory
30 positions.

Moreover, in order to improve the protection of the objects 7, as can be seen in figure 5, preferably the protective device 8 comprises a back wall 32 which

substantially extends vertically and limits the protection zone 10 in the direction of the front of the vehicle, and two side walls 33 which substantially extend vertically and limit the protective zone 10 in the transversal direction of the vehicle. In this example, the side panels constitute the means for anchoring 19.

Of course, the invention is not restricted to the embodiment described above, in detail.

Other means for rendering the stub 7 moveable can be used to articulate the panel 9 in relation to the body 6, in order to lock the panel 9 in one of its positions. It is also possible that means for articulating the panel 9 comprise means rendering the panel 9 stable irrespective of its position, the first and second sensors thus being located along the trajectory of the panel, respectively under the highest low protecting position, and between the highest low protecting position and the highest high protecting position.

Means for anchoring 19, independent of the side panels 33, can also be used.